

WHAT IS CLAIMED IS:

1 1. A method of preparing nickel oxyhydroxide comprising:
2 combining a nickel hydroxide and a hydroxide salt in an inert atmosphere to form a
3 mixture; and
4 exposing the mixture to ozone to form a nickel oxyhydroxide.

1 2. The method of claim 1, wherein the nickel hydroxide includes a beta-nickel
2 hydroxide, a cobalt hydroxide-coated beta-nickel hydroxide, an alpha-nickel hydroxide, or a
3 cobalt hydroxide-coated alpha-nickel hydroxide.

1 3. The method of claim 1, wherein the nickel oxyhydroxide includes a beta-nickel
2 oxyhydroxide, a cobalt oxyhydroxide-coated beta-nickel oxyhydroxide, a gamma-nickel
3 oxyhydroxide, or a cobalt oxyhydroxide-coated gamma-nickel oxyhydroxide.

1 4. The method of claim 1, wherein the inert atmosphere is substantially free of
2 carbon dioxide.

1 5. The method of claim 1, wherein the inert atmosphere is substantially free of water.

1 6. The method of claim 1, wherein the inert atmosphere is substantially free of
2 carbon dioxide and substantially free of water.

1 7. The method of claim 1, further comprising heating the mixture prior to or during
2 exposing the mixture to ozone.

1 8. The method of claim 1, further comprising agitating the mixture during exposing
2 the mixture to ozone.

1 9. The method of claim 1, wherein exposing the mixture to ozone includes contacting
2 the mixture with a gas mixture including ozone.

1 10. The method of claim 9, wherein the gas mixture includes dioxygen.

1 11. The method of claim 9, wherein the gas mixture includes water.

1 12. The method of claim 1, wherein the nickel hydroxide is a powder including
2 particles having a spherical, spheroidal, or ellipsoidal shape.

1 13. The method of claim 1, wherein the nickel hydroxide is a substantially dry nickel
2 hydroxide.

1 14. The method of claim 1, wherein the hydroxide salt includes potassium hydroxide,
2 sodium hydroxide, lithium hydroxide, or mixtures thereof.

1 15. The method of claim 1, wherein the hydroxide salt includes silver hydroxide or
2 gold hydroxide.

1 16. The method of claim 1, wherein the mixture is exposed to ozone for less than 24
2 hours.

1 17. The method of claim 16, wherein the nickel hydroxide includes a cobalt
2 hydroxide-coated beta-nickel hydroxide or a cobalt hydroxide-coated alpha-nickel hydroxide.

1 18. The method of claim 1, wherein the mixture further includes an oxidation-
2 promoting additive.

1 19. The method of claim 18, wherein the oxidation-promoting additive includes
2 metallic silver, silver(+1) oxide, silver(+1,+3) oxide, metallic gold, gold (+3) oxide, gold
3 (+3) hydroxide, potassium peroxide, potassium superoxide, potassium permanganate, or
4 silver permanganate.

1 20. The method of claim 1, wherein the nickel hydroxide includes a bulk dopant.

1 21. The method of claim 1, wherein the bulk dopant includes aluminum, manganese,
2 cobalt, gallium, indium, or bismuth.

1 22. A battery comprising:
2 a cathode comprising a carbonate-free nickel oxyhydroxide;
3 an anode;
4 a separator; and
5 an electrolyte.

1 23. The battery of claim 22, wherein the nickel oxyhydroxide includes a cobalt
2 oxyhydroxide-modified nickel oxyhydroxide.

1 24. The battery of claim 22, wherein the nickel oxyhydroxide includes a cobalt
2 oxyhydroxide-modified gamma-nickel oxyhydroxide.

1 25. The battery of claim 22, wherein the anode comprises zinc.

1 26. The battery of claim 23, wherein the cathode further includes an oxidizing
2 additive.

1 27. The battery of claim 26, wherein the oxidizing additive includes sodium
2 hypochlorite, sodium peroxydisulfate, potassium peroxydisulfate, potassium permanganate,
3 barium permanganate, barium ferrate, silver permanganate, disilver oxide, or silver oxide.

1 28. The battery of claim 22, wherein the electrolyte includes potassium hydroxide,
2 sodium hydroxide, lithium hydroxide, or mixtures thereof.

1 29. A method of manufacturing a battery comprising:
2 combining a nickel hydroxide and a hydroxide salt in an inert atmosphere to form a
3 mixture;
4 exposing the mixture to ozone to form a nickel oxyhydroxide; and
5 assembling a cathode comprising the nickel oxyhydroxide, an anode, a separator, and
6 an electrolyte to form the battery.

1 30. A method of decreasing capacity loss in a nickel oxyhydroxide battery
2 comprising:
3 combining a nickel hydroxide and a hydroxide salt in an inert atmosphere to form a
4 mixture;
5 exposing the mixture to ozone to form a nickel oxyhydroxide;
6 forming a cathode including the nickel oxyhydroxide; and
7 assembling the cathode, an anode, a separator, and an electrolyte to form the alkaline
8 battery,
9 wherein the battery has a capacity loss after storage for 4 weeks at 60°C of less than
10 30 percent.

 31. The method of claim 30, wherein the nickel hydroxide is cobalt hydroxide
modified nickel hydroxide.